AUDIO MIMICRY: AN ADJUNCT TO COLOR MIMICRY

By Albro T. Gaul
Brooklyn, New York

During the summer of 1951, while I was working on some aspects of Vespine wing muscle physiology, I had the opportunity to study some of the wing sounds of certain Vespine mimics. The work was done at Windsor, Mass., with specimens of *Dolichovespula arenaria* F. (Vespidae) and *Spilomyia hamifera* Lw. (Syrphidae). A comparison of the wing tones of these two species has led to the following considerations.

In color pattern, this fly bears a very close resemblance to the wasp, although the abdomen of the fly is somewhat more robust. It is very difficult for me to tell these species apart when they are in flight. Even when the insects are at rest, the longitudinal fuscous band along the wing of the fly makes visual determination difficult without close scrutiny. It is not known just what, if any, function is served by this likeness; nor can it be definitely determined which insect is the mimic and which the model. It is not a unique relationship between the two genera, since *Spilomyia fusca* Lw. closely resembles *Dolichovespula maculata* Linn. in size and color pattern.

The original wing experiments involved the use of a microphone and an electro-mechanical transducer to pick up wing beat tones and thoracic vibrations. The output from these instruments was played through a high fidelity preamplifier and amplifier system and was then led into the input terminals of either an audio-frequency meter or an oscilloscope. With either instrument it was possible to measure the wing-beat frequencies of the insects. A direct comparison of frequencies was therefore made between the wing tones of *S. hamifera* and *D. arenaria*. The more or less standard wing frequency of workers of *arenaria* is

150 strokes per second; while that of *hamifera* is 147 strokes per second. This places both tones between D and D#. These readings were made with 42 *arenaria* workers and 8 *hamifera* adults. The accuracy of the meter was within 1 cycle per second, at this low frequency range. The variation in the wing beats was within plus or minus 2 strokes per second. Temperature is probably not a factor in wing frequency in insects of this size[1].

With the average wing beat differing by only 2 strokes per second, or 1.33%, it is apparent that the average person, including the author, can detect no significant difference in the sounds produced. Even close attention to sound recordings of the two species cannot show any appreciable distinction. It is thus apparent that there is a new form of mimicry, the mimicry of sounds, which in one case at least accompanies color mimicry.

There is little evidence that the color mimicry of these wasps and flies serves any particular function. Perhaps there is common protection against predators, who have only to learn one color pattern. The introduction of sound mimicry into the picture forces us to accept one of two possible conclusions. Either the similarity of wing tone is a chance phenomenon, or we must postulate a significant function to this similarity of wing beats. In the latter case, we should further have to show that certain predators of *Spilomyia* and *Dolichovespula* can detect their prey through sound ranging but are unable to detect the differences which exist between the two sound mimics.

[1] Gaul, A. T. A Relation Between Temperature and Wing Beats. Bull. Brooklyn Ent. Soc., **46**: 131-133, 1951.